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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/252,507	02/18/1999	WOLFGANG HELD	A32188PCTUSA	4587

21003 7590 03/13/2002

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EXAMINER

VARCOE JR, FREDERICK T

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 03/13/2002

157

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/252,507

Applicant(s)

Held

Examiner

Varcoe

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on Aug 7, 2001

2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-44 is/are pending in the application

4a) Of the above, claim(s) 33-44 is/are withdrawn from consideration

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-32 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirements

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

19) ☐ Notice of Informal Patent Application (PTO-152)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

20) ☐ Other: _____

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DETAILED ACTION

Response to Amendment

The amendment of August 7, 2001, has been received. Claims 1-44 are pending in this application. Claims 33-44 are non-elected and have been withdrawn from consideration but are not yet canceled.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 15, 17-20, 22, 23, 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Araki et al. U.S. Patent No. 5,404,719.

With regard to claim 1, Araki discloses an internal combustion engine arrangement comprising an internal combustion engine. Presumably this includes both diesel and spark-ignited engines. Araki discloses an exhaust line receiving exhaust gas from the internal combustion engine (Araki Figure 1 (6)). Araki discloses an oxide gas absorber in the exhaust line (column 1 line 41-43) including a support member having a total surface area that is larger

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than that of the underlying area of the support member. Araki's monolith of alumina is coated with metals that results in a layer on the alumina having greater surface area than the underlying alumina. Araki discloses an absorption layer on a surface exposed to a flow of gas and capable of reversibly absorbing at least one nitrogen oxide and/or at least one oxide of sulfur (Araki column 1 lines 41-43).

The instant claim recites a control unit means for controlling the temperature of the absorption layer by adjusting the composition parameters of the exhaust gas. This is means plus function language that invokes 35 U.S.C. 112 paragraph 6. The details of the means include supplemental electric heating, ignition control, variation of lambda, addition of secondary air, and heating with a burner (Specification, page 7 lines 14-19), and injecting fuel into the exhaust as well as inductive heating and exhaust throttling (Specification page 10 line 24 to page 11 line 4). Araki discloses means for controlling the temperature of the absorption layer that include electric heating (column 5 line 55), injecting fuel into the system and injecting air into the system (Araki claim 1). Araki discloses a control unit for controlling these processes (ECU column 2 line 18-26).

Araki thus anticipates the invention of claim 1.

With regard to claim 15, Araki discloses an absorption layer that contains an aluminum oxide (column 2 line 39: alumina is an aluminum oxide).

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With regard to claims 17 and 18, Araki discloses an absorption layer containing an element selected from the group consisting of alkali metals, alkaline earth metals, rare earths, lanthanum, titanium, copper and manganese, and where the absorption layer contains at least one of the elements barium, sodium and potassium (column 2 lines 38-45).

With regard to claim 19, absorption from a exhaust gas with an excess of oxygen during lean operation of the internal combustion engine is an intended use and does not patentably distinguish the claim from the prior art.

With regard to claim 20, Araki discloses an absorbing layer releasing at least one of NO_x and SO_x in a reducing atmosphere or at low oxygen concentration (column 1 lines 50-52: a rich exhaust mixture has a low oxygen concentration).

With regard to claim 22, Araki discloses an absorption layer that releases at least one of NO_x and SO_x at an elevated temperature (Abstract).

With regard to claim 23, Araki discloses a temperature measuring means (18) and control means (20) for receiving the temperature signal and controlling charging or discharging of the gas absorption layer.

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With regard to claim 28 Araki discloses an absorption layer including a precious metal (column 2 line 44).

With regard to claim 29 Araki discloses an absorption layer including an oxidation catalyst (column 2 lines 38-45; for example, Pt is an oxidation catalyst) containing the precious metal.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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4. Claims 2-11, 16 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. U.S. Patent No. 5,404,719, as applied to claims 1, 15, 17-20, 22, 23, 28 and 29 above, in view of Cornelison et al. U.S. Patent No. 5,240,682.

With regard to claim 2, Araki discloses essentially the same invention as that of the instant claim but fails expressly to disclose a metal support member.

Cornelison discloses a metal support member (Abstract).

Cornelison and Araki are analogous art in that both deal with exhaust gas NO_x removal.

At the time of the invention it would have been obvious to one skilled in the art to use the support material of Cornelison with the apparatus to Araki.

The motivation would have been to utilize a metal thickness that was thin enough to be light weight and capable of accepting corrugation in a non-nesting pattern, such as herringbone or chevron and capable of over-folding (Cornelison column 4 lines 16-29).

With regard to claim 3, Cornelison discloses a metal support member that is a metal sheet or foil (Cornelison column 4 lines 16-29).

With regard to claim 4, the modified apparatus of Araki discloses a metal support member heatable by application of electric current (Araki column 5 line 55).

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With regard to claims 5 and 6, Cornelison discloses a support member having a wall thickness less than or equal to 0.16 mm in the region provided with the absorption layer (column 4 lines 26-29). Specifically, Cornelison discloses a thickness of 0.0406 mm (0.0016 inches).

The motivation for combining metal support material this thin would have been to utilize a thickness that was thin enough to be light weight and capable of accepting corrugation in a non-nesting pattern, such as herringbone or chevron and capable of over-folding (Cornelison column 4 lines 16-29). Cornelison discloses a metal support member with a wall thickness less than 0.1 mm and 0.05 mm (column 4 lines 16-29). (A thickness of 0.001 inch is equal to 0.0254 mm, which is less than 0.05 mm.)

With regard to claims 7-11, it is well-known in the art, as disclosed by Cornelison, to build exhaust treatment devices using a variety of internal shapes and configurations, including parallel passages with closed cross-section, structures that render the flow turbulent, corrugation, subdivided passages, and features having various lengths, cross sections and numbers of passages.

With regard to claim 16, Cornelison discloses an absorption layer containing gamma aluminum oxide (column 1 line 31).

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With regard to claim 25 and 26, Cornelison discloses a support member made of a ceramic material (column 1 line 23) and of a metal foil (Abstract). The thickness of the absorption layer is a result-effective variable. It would have been obvious to one skilled in the art to experimentally determine the thickness that is thick enough to hold a sufficient amount of oxide gas without being so thick as to require unacceptably long purge times.

With regard to claim 27, Cornelison discloses an absorption layer applied as a wash coat (column 1 line 30).

5. Claims 12-14 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. U.S. Patent No. 5,404,719 as applied to claims 1, 15, 17-20, 22, 23, 28 and 29 above, in view of Neal et al., U.S. Patent No. 4,755,499.

With regard to claims 12-14, Araki discloses essentially the same invention as the instant claims but fails expressly to disclose an absorption surface with an area of at least 20 M² Neal discloses an alumina substrate with a surface area above 100 square meters per gram (Neal column 5 line 30). This is above the lower limits presented in claims 12-14.

Neal and Araki are analogous art in that both deal with removing nitrogen oxides and sulfur oxides from gas streams.

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At the time of the invention it would have been obvious to one skilled in the art to use material with a high absorption surface like that of Neal in the apparatus of Araki.

The motivation would have been to use sorbents that are outstandingly effective for the removal of nitrogen oxides and sulfur oxides from waste gas streams (Neal Abstract).

With regard to claim 30, Neal discloses an absorption layer with a pore volume of at least 0.2 cubic centimeters per gram of mass (column 6 lines 1-4).

6. Claims 21, 24, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. U.S. Patent No. 5,404,719, as applied to claims 1, 15, 17-20, 22, 23, 28 and 29 above, in view of Takeshima et al. U.S. Patent No. 5,388,406.

With regard to claims 21 and 24, Araki discloses essentially the same invention as the instant claims but fails expressly to disclose an oxygen sensor. Takeshima discloses an arrangement comprising oxygen detecting means (Figure 8 (74)) generating a signal supplied to the control means (66). Araki discloses a temperature measuring means (18). Takeshima also discloses a temperature measuring means (16) and control means (66) for receiving the temperature signal and controlling charging or discharging of the gas absorption layer (column 9 lines 41-58). At the time of the invention it would have been obvious to one skilled in the art to add an oxygen sensor to the apparatus of Araki. The motivation would have been to permit measurement of the air-fuel ratio in the exhaust (Araki claim 1).

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With regard to claims 31 and 32, Araki discloses essentially the same invention as that of the present claim but fails expressly to disclose a separate three-way oxidation catalyst. Takeshima discloses a separate oxidation catalyst exposed to the flow of gas (column 8 lines 38-40). Three-way catalysts catalyze oxidation. At the time of the invention it would have been obvious to one skilled in the art to include the three-way catalyst of Takeshima in the apparatus of Araki. The motivation would have been to enable removal of HC, NO_x and CO from the gas stream.

Response to Arguments

7. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Varcoe, whose telephone number is (703) 306-5477. The examiner can normally be reached Monday through Friday from 9:00 am to 5:00 pm.

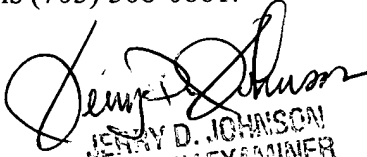
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian Knode, can be reached on (703) 308-4311.

The FAX telephone number for this Group Art Unit is (703) 872-9311 (for Official papers after Final), (703) 872-9301 (for other Official papers) and (703) 305-6357 (for Unofficial papers).

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When filing a FAX in Group 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communications with the PTO that are not for entry into the file of the application. This will expedite processing your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.


JERRY D. JOHNSON
PRIMARY EXAMINER
GROUP 1700

RV

March 6, 2002